

MASS FLOW SENSOR AND METHODS OF DETERMINING MASS FLOW OF A FLUID

ABSTRACT OF THE DISCLOSURE

[0065] The mass flow rate sensor includes a waveguide disposed in a flow passage having a bluff body facing in an upstream direction. Waves are pulsed along the waveguide for interaction with the fluid. A receiver is coupled to the waveguide to detect a propagated wave and provides a first output signal proportional to the transit time of the propagated wave for determining fluid density. The receiver also provides a second output signal proportional to the shedding frequency of vortices from the waveguide to determine velocity. An electronics module calculates mass flow rate from the velocity times density times area of the flow passage and a constant. In other forms, the velocity is ascertained by transmitting an ultrasonic beam through the shedding vortices to determine vortex frequency which is proportional to velocity.